AGS Polarization – Comments from the 2003 Run
18Nov03 Ahrens

1) The "Gauss Clock" timing framework seems adequate.

AC dipole timing scans give polarization dependence close to expections.

Magnetic "flat tops" at correct Gγ. No tuning of the intermediate porches necessary. If Woody's sharp polarization loss spikes are at (.3 and .7) on 46.5 porch then our position is nearly perfect. Fig 1

However calibration measurements no so robust during the run. (gold work)

2) Intensity dependence of measured polarization in AGS (?) and the poor polarization over the last shift of the run – effects not yet cleanly understood.

Plot of some (Pol vs Int) from the last two weeks of the run. fig 2

3) AC Dipole behavior and associated beam behavior.

Deterioration (over the run) of the beam coherent motion during the dipole pulse. That this structure was getting "worse" was not particularly obvious and does not particularly correlate with polarization loss. But it may be important. We need to quantify the structure and pay attention to it. fig 3 & 4

The (magnet-power supply) system for the AC dipole was not healthy. Will be better next time.

4) Up-the-Ramp measurement clearly showed no polarization loss as the beam passed through the Gγ=48-ν_y resonance region, where a 10 % loss is expected. mystery!

The measurement looks good. Can our machine and model differ enough to explain this? fig 5

Maybe we can make some measurements of the AGS beta function around the machine using the response of the beam position monitors to dipole orbit distortions.

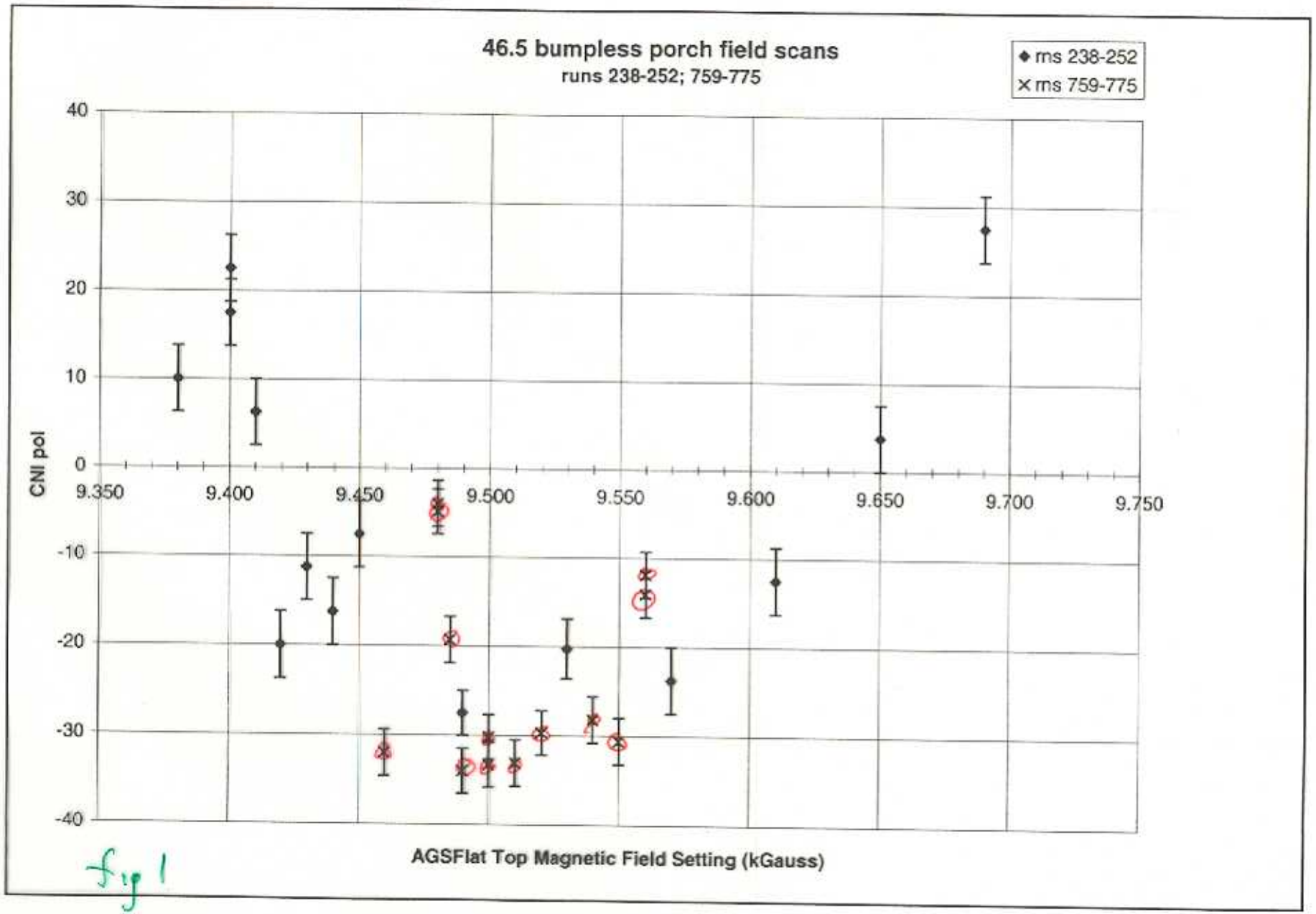

46.5 bumpless porch field scans
runs 238-252; 759-775
◆ ms 238-252
× ms 759-775
CNI pol
40
30
20
10
0
-10
-20
-30
-40
9.350
9.400
9.450
9.500
9.550
9.600
9.650
9.700
9.750
AGSFlat Top Magnetic Field Setting (kGauss)

fig 1

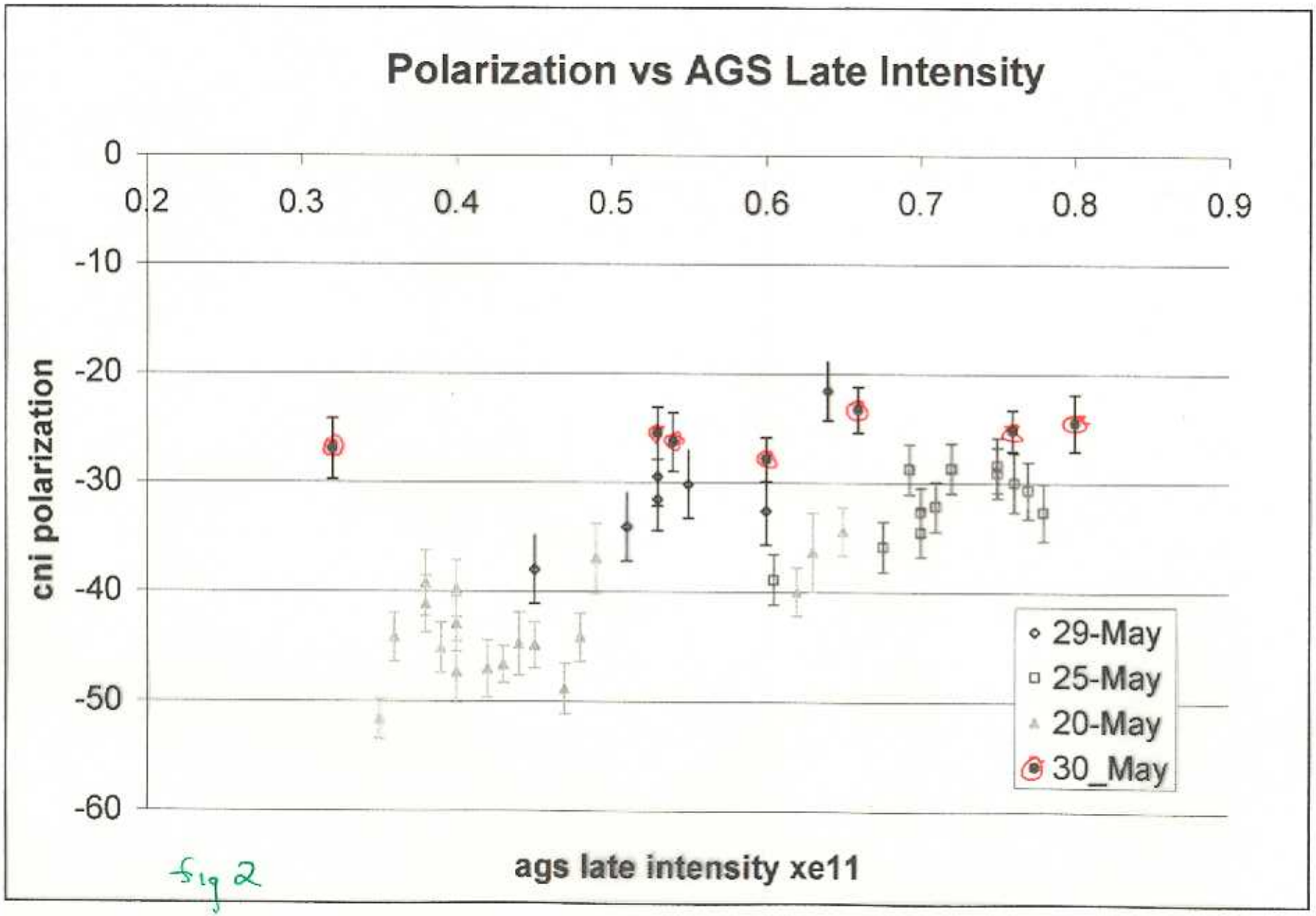

Polarization vs AGS Late Intensity
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
-10
-20
-30
-40
-50
-60
cni polarization
ags late intensity xe11
29-May
25-May
20-May
30_May

fig 2

21 March 03

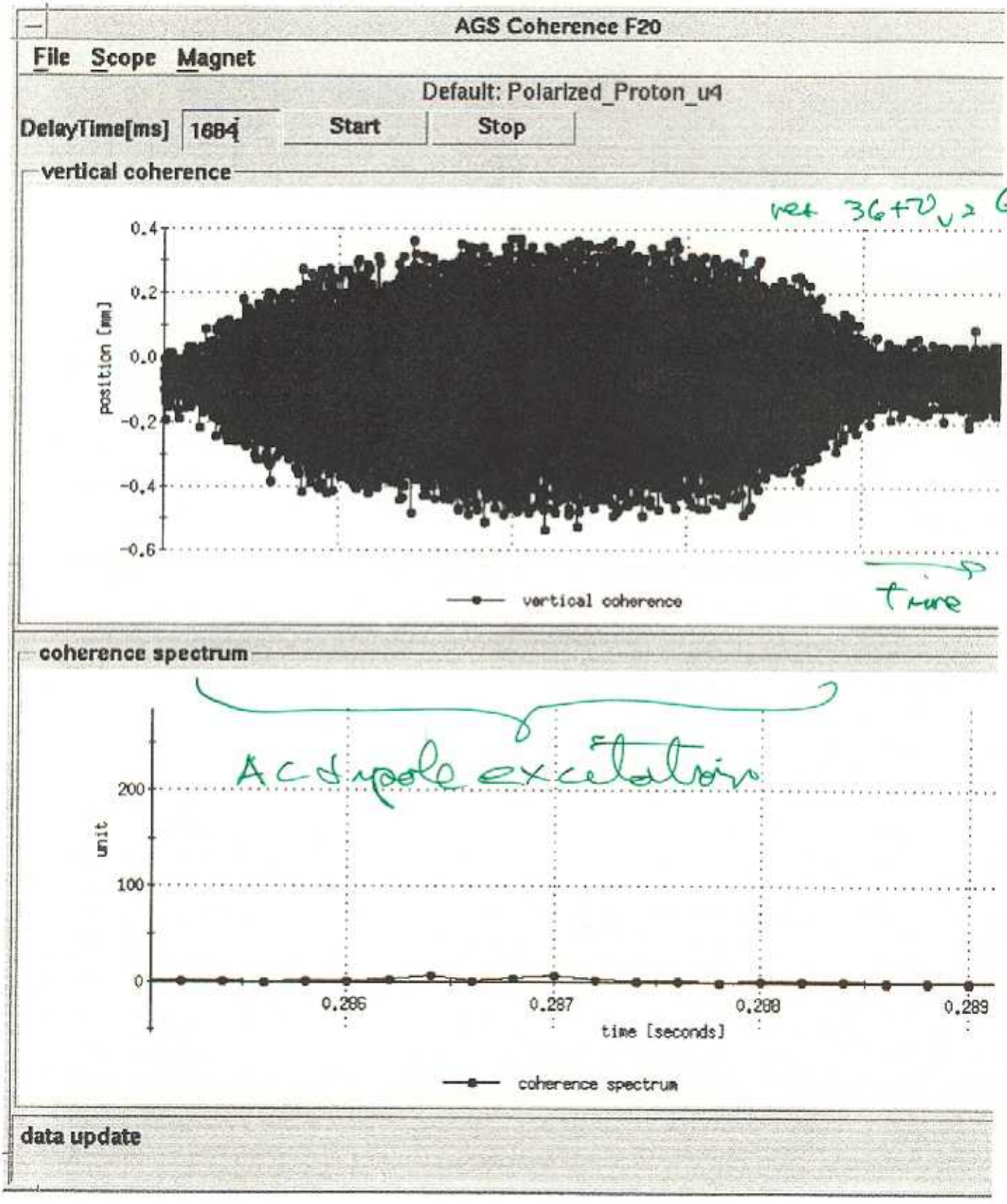


fig 3 (early)

mid-May '03

AGS Coherence F20

File Scope Histogram

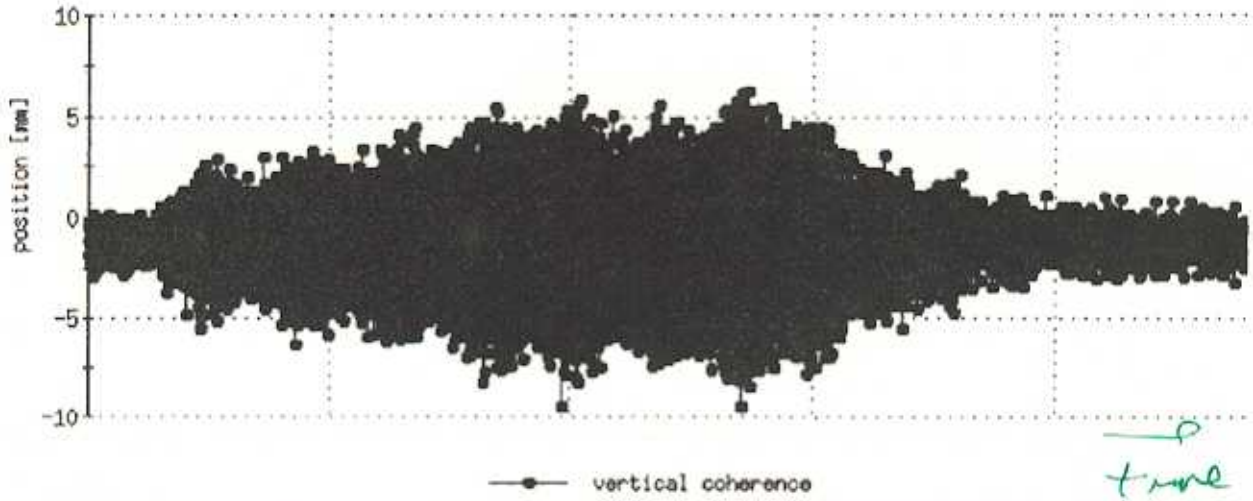
Default: RHIC_PolProt_U4

DelayTime[ms] 1683 Start Stop

vertical coherence

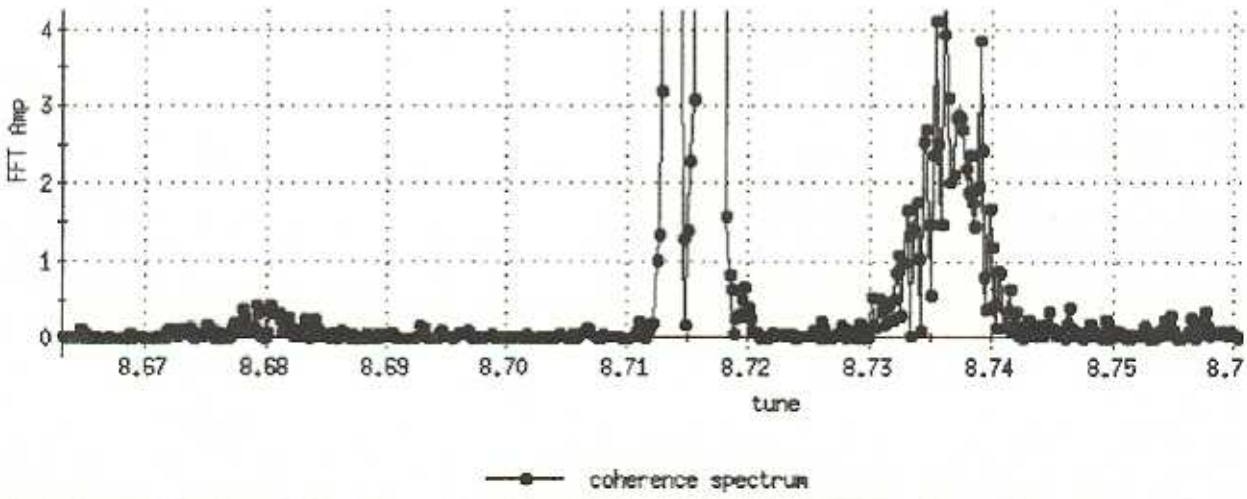
Coherence Amplitude=5.3413

or $36+2\nu_x = 0\delta$



coherence spectrum

Peak1=8.7168, Peak2= 8.7131, Delta= -0.0037



data update

figure 4 (late in run)

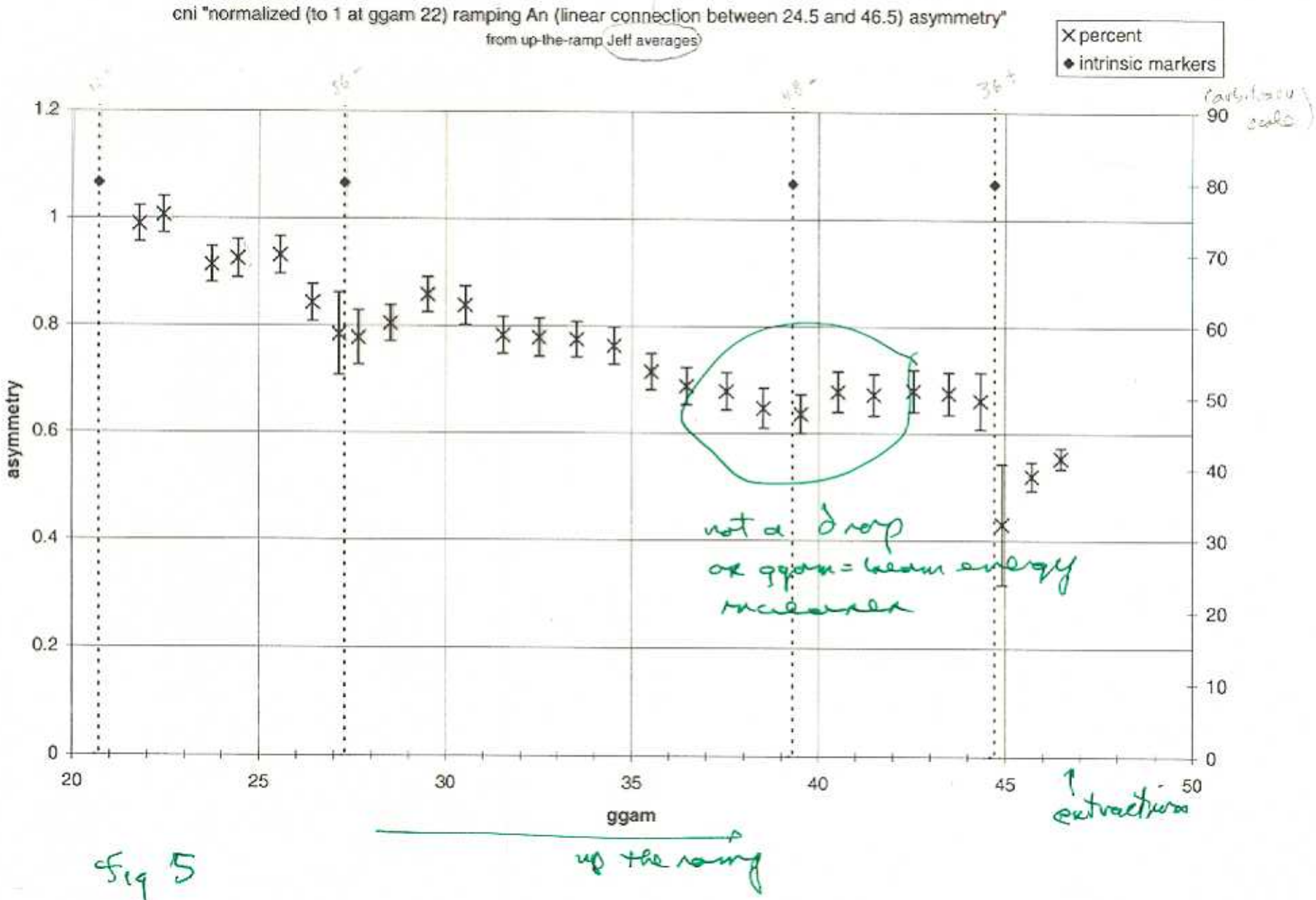

cni "normalized (to 1 at ggam 22) ramping An (linear connection between 24.5 and 46.5) asymmetry"
from up-the-ramp Jeff averages
percent
intrinsic markers
asymmetry
ggam
not a drop
or ggam = beam energy
increased
extraction
up the ramp

Fig 5